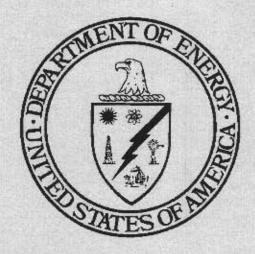


Sandia National Laboratories/New Mexico

PROPOSAL FOR NO FURTHER ACTION ENVIRONMENTAL RESTORATION PROJECT SITE 113, AREA II FIRING SITES OPERABLE UNIT 1303

June 1996

Environmental Restoration Project



United States Department of Energy Albuquerque Operations Office

PROPOSAL FOR NO FURTHER ACTION ENVIRONMENTAL RESTORATION PROJECT

SITE 113, AREA II FIRING SITES OPERABLE UNIT 1303 June 1996

Prepared By Sandia National Laboratories/New Mexico Environmental Restoration Project Albuquerque, New Mexico

Prepared for the United States Department of Energy

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1. INTRODUCTION

1.1 ER Site Identification Number and Name

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Sandia National Laboratories/New Mexico (SNL/NM) is proposing a No Further Action (NFA) decision for Environmental Restoration (ER) Site 113, Area II Firing Sites, Operable Unit (OU) 1303, based on administrative controls and results of confirmatory sampling. ER Site 113 is located in Technical Area (TA)-II and contains two high-explosive (HE) firing sites that were primarily used to determine the amount of energy required to detonate or ignite small explosive devices. During the testing experiments, some material may have entered the atmosphere. Administrative controls, documented since 1991, ensured appropriate operating procedures were in place to prevent a release which may threaten human health or the environment. To characterize any environmental impacts that may have resulted from pre-1991 conditions, both of the firing sites were surveyed for radiological activity, soil vapor, debris, explosive ordnance, or other disturbances (by means of interpretation of historical aerial photographs), and soil was sampled and analyzed for potential contaminants of concern (COC); the results showed no elevated levels of HE or other constituents.

1.2 SNL/NM Administrative NFA based on Administrative Controls and Confirmatory Sampling

This proposal for a determination of a NFA decision based on administrative controls and confirmatory sampling was prepared using the criteria presented in Annex B, NFA Process and Criteria, of the Document of Understanding (DOU 1996). Specifically, this proposal must contain sufficient documentation to provide reasonable assurance that an NFA is appropriate.

This request for a NFA decision for ER Site 113 is based on documented and referenceable administrative controls, survey results, and analytical results of confirmatory soil samples collected from the site. Administrative controls, documented since 1991 (Berry 1991), demonstrate that the unit had design and/or operating characteristics that effectively prevented releases to the environment. Standard operating procedures, implemented in April 1994 (SNL 1994a), further demonstrate appropriate procedures were in place to prevent a release.

In order to evaluate potential threats to human health and the environment prior to the implementation of documented administrative controls, confirmatory surveys and sampling were conducted. Concentrations of site-specific COCs were first compared to background upper tolerance limits (UTLs) for COCs found in SNL/NM soils (SNL 1996). If background data were not available for a particular COC, concentrations of that constituent were compared to Proposed 40 CFR Part 264 Subpart S (Subpart S) soil action levels (EPA 1990). Concentrations of contaminants at this site were less than either or both of background UTLs or Subpart S action levels. This unit is therefore eligible for a NFA proposal based on the following criterion taken from the DOU:

NFA Criterion 3: No release to the environment has occurred, nor is likely to occur in the future.

1.3 Local Setting

SNL/NM occupies 2,829 acres of land owned by the Department of Energy (DOE), with an additional 14,920 acres of land provided by land-use permits with Kirtland Air Force Base, the United States Forest Service, the State of New Mexico, and the Isleta Indian Reservation. SNL/NM has been involved in nuclear weapons research, component development, assembly, testing, and other nuclear activities since 1945.

ER Site 113 (Appendix 1) is owned by the DOE and is located in the northeastern portion of TA-II, one of five Technical Areas within SNL/NM. The area is diamond-shaped, approximately 1450 feet on a side, and encompasses 45 acres. The center of TA-II is approximately 3000 feet south of TA-I, the location for most administrative and research activities. TA-II abuts TA-IV to the south. TA-II is surrounded by a 10-feet high chain link fence, with a security gate at the west corner. TA-II currently contains 22 buildings and four mobile offices. The area has been, for the most part, vacated. Explosive testing operations have been relocated to the new Explosive Components Facility located east of TA-II. Future land use of TA-II has been designated as industrial.

TA-II lies west of the basin-bounding fault complex and northwest of the Tijeras Arroyo fault, which are the two main structural features of the Albuquerque Basin. The geologic material consists of thick alluvial sediments that overlie deep bedrock. An alluvial fan and piedmont colluvium overlie Santa Fe Group strata. The Santa Fe deposits are approximately 3,000 feet thick beneath TA-II (Hawley and Haase 1992). Detailed descriptions of the regional geology are in the annual Site-Wide Hydrogeologic Characterization Project (SWHCP) 1995 Annual Report (SNL 1995a).

SWHCP soil surveys and surficial mapping activities provide general soil characteristics for TA-II. The escarpment of the Tijeras Arroyo is associated with poorly developed soils, such as the Bluepoint-Kokan Association (Hacker 1977). Areas underlain by this soil series locally contain well-developed calcic horizons, which are the remnants of the Tijeras, Wink, and Madurez soil originally developed on older surficial deposits. The Bluepoint-Kokan soil reflects erosion of older soil and is characterized by discontinuous soil horizons. The heterogeneity would be expected to strongly influence the location and rates of infiltration and geochemical interactions between soil and percolating water (SNL 1995a). TA-II is characterized as having an average surface soil permeability of approximately 0.1 inch per hour (SNL 1995a).

No perennial surface-water bodies are present within TA-II or in the immediate vicinity of the area. However, a large ephemeral surface drainage, Tijeras Arroyo, is located directly southeast of TA-II. TA-II is located outside the 100- and 500-year floodplains of Tijeras Arroyo.

Depth to regional groundwater in the vicinity of TA-II is approximately 540 feet below ground surface, with shallower water-bearing units present at approximately 300 feet below ground surface (SNL 1995). The general flow of regional groundwater is to the north-northwest. In the shallower saturated zones, the groundwater gradient is to the south-southeast. No water supply wells are present within TA-II.

2. HISTORY OF THE SWMU

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2.1 Sources of Supporting Information

In preparation for requesting a NFA decision based on administrative controls and confirmatory sampling for ER Site 113, a background study was conducted to collect available and relevant site information. Background information sources included existing records and reports of site activity. In addition, interviews were conducted with SNL/NM staff and contractors familiar with site operational history. The study was completely documented and has provided traceable references which sustain the integrity of this proposal.

The following information sources were available for use in the evaluation of ER Site 113:

- Interviews with past TA-II workers;
- Historical records:
- The Site-Wide Hydrogeologic Characterization Project 1995 Annual Report;
- The Groundwater Protection Program Calendar Year 1995 Annual Groundwater Monitoring Report;
- ES&H Standard Operating Procedures; and
- Results of surveys and soil analyses.

Utilizing this information, a brief history of ER Site 113 and a discussion of all relevant evidence regarding past practices and releases at the site have been prepared and are presented in this proposal for a administrative NFA decision based on administrative controls and confirmatory sampling.

2.2 Previous Audits, Inspections, and Findings

The Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment (DOE 1987) contains the following:

Hundreds of explosive shots were conducted behind Building 922 (Site 113). Aluminum-covered detonators were fired in many of the shots. Some shots may also have contained heavy metals. It is not known what residual materials may be left at this site.

2.3 Historical Operations

The TA-II Firing Sites consist of two HE firing sites located in the northeastern portion of TA-II. One site is east of Building 907 and the other is east of Building 922 (Appendix 1). The firing sites consist of an above-ground "boom box" along the eastern wall of each building (Appendix 2). These "boom boxes" were primarily used to determine the amount of energy required to detonate or ignite small explosive devices. They were in use from about 1965 to June 1995. The Building 907 Firing Site was used as the primary location for outdoor testing. The Building 922 Firing Site was used occasionally for special tests. The firing sites are located in fenced, secured areas with access strictly controlled.

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3. EVALUATION OF RELEVANT EVIDENCE

3.1 Unit Characteristics

Testing activities at Site 113 varied in frequency from several times a day to several times a week and involved detonating explosive devices. The explosive devices or explosive "charges" typically consisted of explosive material encased in a metal shell. The weight of the explosive charges typically ranged from 0.125 to 1.0 pound. The explosive devices usually contained either a detonator or an ignitor attached to an electrical connector. The detonators and ignitors were covered with a thin layer of lead, copper, iron, or aluminum. The HE material encased in the metal shell consisted primarily of pyrotechnic powders, such as zirconium potassium perchlorate, titanium potassium perchlorate, or plastic explosives contained in a plastic binder. Other materials that may have been used with the explosive materials include manganese and chromium. The metal shells or "explosive casings" may have contained depleted uranium (DU) on occasion. During the 1960s and 1970s, the metal shells commonly were coated with lead. Mercury fulminate was never used at TA-II because of its limited fracturing power.

During a detonation, explosive material may have escaped through the open side of the "boom box." Therefore, the detonated explosive materials (residue), if any, may have settled on the ground surface and would be located east of Buildings 907 and 922. At Building 907, COCs, if present, would be more concentrated closer to the "boom box", with concentrations dropping off as the distance increases due to the effects of dispersion. During periods of precipitation, asphalt paving adjacent to and east of the Building 907 firing site would have allowed for more concentration of COCs just east of the firing site due to run-off of any contaminants.

Building 922 has a wall to the east of the firing site which would have limited the extent of any COCs to the area between the firing site and the wall. After a test in either "boom box", any unburned explosive residues and metal fragments reportedly were collected.

3.2 Operating Practices

Documented administrative controls (Berry 1991) and SNL/NM Environmental, Safety and Health Standard Operating Procedures (SNL 1994a) list and specify procedures for safely performing explosive operations, including waste management practices. These procedures comply with applicable State and Federal regulations. Therefore, environmental investigations conducted prior to the discontinued use of the firing sites provide an accurate representation of current site conditions and demonstrate that, prior to implementation of administrative controls, explosive testing did not compromise environmental conditions.

3.3 Presence or Absence of Visual Evidence

The "boom boxes" are still present. Explosive testing was discontinued in June 1995. No visual evidence of compromised environmental conditions is present.

3.4 Results of Previous Sampling/Surveys

In order to determine the significance of potential threats to human health or the environment at this site prior to the implementation of documented administrative controls, environmental testing was conducted. Testing included a surface radiation survey, passive soil-vapor survey, geophysical surveys, interpretation of historical aerial photographs, soil sampling, and an explosive/ordnance survey. As summarized below, results indicate that further investigation is not warranted and that Site 113 should be removed from the ER site list.

On March 20, 1994, a surface radiation survey was performed at the TA-II Firing Sites (DOE 1994) to evaluate the potential threat from the reported historical use of Du in explosive tests. The radiation survey was performed using a gamma scintillometer, held at the ground surface on six-foot centers (100% coverage) over the entire site areas, and a pressurized ionization chamber (PIC). In the area east of Building 907, activities were measured between 90 and 120 counts per second (cps) with the gamma scintillometer and at 11 to 13 micro Roentgen per hour (mR/h) with the PIC. The area surveyed adjacent to Building 907 is covered with asphalt and the area surveyed east of the asphalt has little vegetation. In the area east of Building 922, activities were measured between 80 and 110 cps with the gamma scintillometer, and at 10 to 12 mR/h with the PIC. The area surveyed between the Building 922 "boom box" and the bermed wall consists of native soil. No gamma anomalies were detected. Appendix 3 shows the boundaries of the radiation survey.

From November 11 to December 3, 1993, a passive soil-vapor-survey (SVS) investigation was conducted in the areas east of Buildings 907 and 922 (NERI 1994). No volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs) were identified from the SVS investigation within the ER site boundaries (Appendices 4, 5, and 6). However, benzene, toluene, ethylbenzene/xylenes (BTEX) were detected to the south and east of the Building 907 firing site. These small isolated anomalies most likely reflect areas where vehicles were parked and small drips or spills occurred and are not likely to represent detectable concentration levels of BTEX in the surface or subsurface soil. This assumption is based on results of surface and sub-surface soil analyses at other TA-II locations where BTEX was detected in soil vapor but not in soil samples. Detection of TCE and PCE near the eastern apex of TA-II will be investigated as part of the landfill voluntary corrective measure scheduled to be completed by the end of 1997.

The firing site located east of Building 907 was part of a geophysical Surface Towed Ordinance Locator System (STOLS™) survey conducted in December 1993 (Geo-Centers 1994) and an electromagnetic (EM) survey conducted in December 1993 (LAMB 1994)(Appendices 7 and 8, respectively). No anomalies related to buried material were identified. Surface debris was visually identified as described below.

From December 1993 through July 1994, analysis and interpretation of historical aerial photographs was conducted for photos taken from 1939 to 1993 (Ebert 1994). The project identified areas of historical activity and the nature of those activities. Results indicated more vigorous vegetation near the firing sites due to run-off of precipitation from the sites.

During April 1994, surface and shallow subsurface soil samples were collected east of Buildings 907 and 922 (SNL 1994). Surface and shallow subsurface soil samples were collected because material released to the atmosphere from explosive tests conducted prior to documented administrative controls may have settled on the ground surface or could have been washed from the testing areas onto surface soils during periods of precipitation. Interpretation of historical aerial photographs identified areas of more dense vegetation around the edges of the asphalt pad (Ebert 1994). Soil samples were analyzed for HE compounds (HPLC method) and metals (TAL method). Ten surface and three subsurface soil samples were collected east of Building 907. Two surface samples were collected east of Building 922 (see Appendix 1 for sample locations).

Analytical reports show non-detect results for explosives for all samples. Results of metals analyses for potential COCs are shown in Appendix 9. Aluminum and iron are not considered as toxic substances and therefore were not included in Appendix 8. Chromium results ranged from 5.2 milligram per kilogram (mg/kg) to 12.5 mg/kg, all below the SNL/NM background UTL of 17.3 mg/kg (surface soil 0 - 6") and 12.8 mg/kg (subsurface soil > 0.5'). Copper results ranged from 8.1 mg/kg to 110 mg/kg; the SNL/NM background UTL for copper is 25.5 mg/kg (surface) and 88.2 mg/kg (subsurface). Copper is not a concern because it is an essential element to life, and most species have evolved well-developed homeostatic mechanisms which act to control the balance of copper (EPA 1987). Lead was measured from 9.3 mg/kg to 71.4 mg/kg. The SNL/NM background UTL for lead is 68 mg/kg (surface) and 11.2 mg/kg (subsurface). Guidance provided by EPA in a July 14, 1994, memorandum on residential lead-contaminated soil lists an acceptable level of 400 parts per million (ppm) lead in bare soil (EPA 1994). Manganese results ranged from 155 mg/kg to 321 mg/kg. Background concentrations for manganese have not been established. Subpart S action levels for manganese in food is 10,000 mg/kg and in water is 400 mg/kg.

In February 1996 an explosive/ordnance survey was conducted within the ER Site 113 boundaries (Aguirre 1996). The firing sites were scanned visually and with a metal detector. No explosive or ordnance items were located.

3.5 Assessment of Gaps in Information

Information collected through historical interviews and documented administrative controls did not demonstrate the significance of potential environmental contamination due to historic practices (i.e. pre-1991). Surveys and soil sampling and analyses were conducted to characterize the potential threat to human health and the environment resulting from explosive testing conducted prior to the implementation of documented administrative controls.

3.6 Confirmatory Sampling

Results of confirmatory surveys and soil analysis are discussed in Section 3.4.

3.7 Rationale for Pursuing a Confirmatory NFA Decision

Documentation of operating practices prior to 1991 do not exist. In order to determine the potential for threat to human health and the environment prior to documented administrative controls, surveys and soil sampling and analysis were conducted. Results indicate no release to the environment has occurred, nor is likely to occur in the future.

4. CONCLUSION

Based on the inactive status of the site, adherence to documented administrative controls since 1991, and results of surveys and soil sampling and analysis, no release to the environment has occurred, nor is likely to occur in the future.

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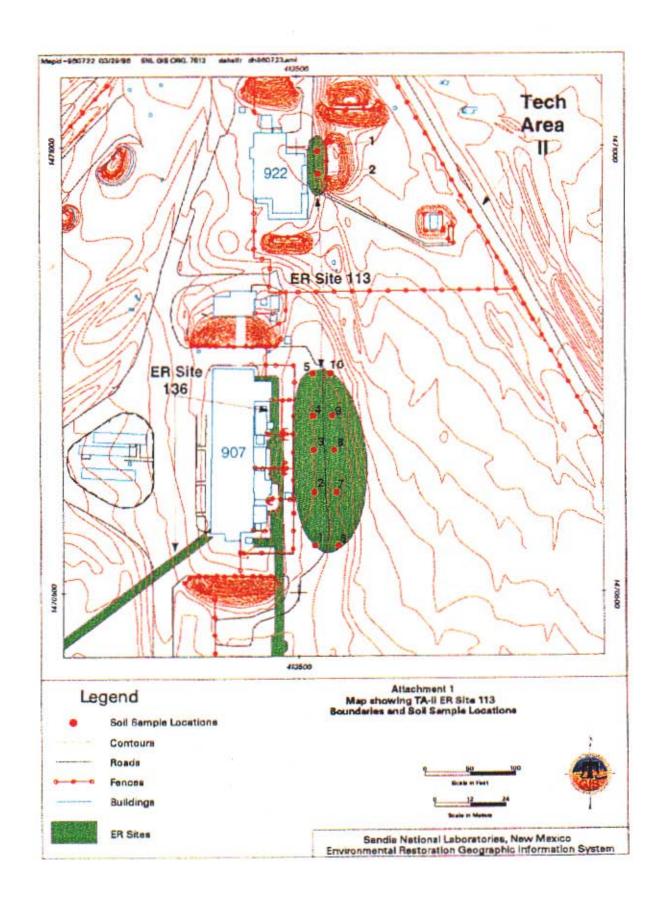
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APPENDIX A

Map showing TA-II ER Site 113 boundaries and soil sample locations

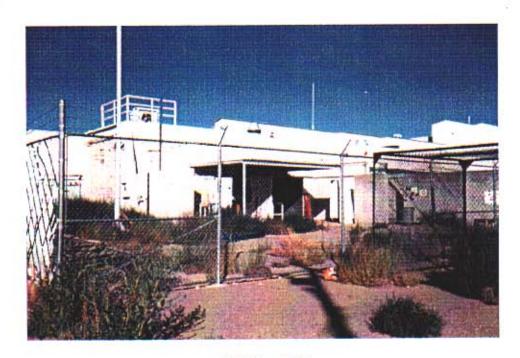
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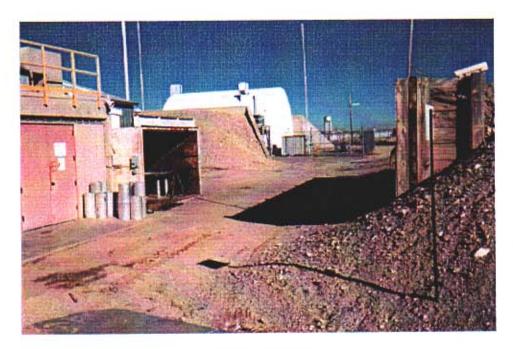
APPENDIX B

Photographs of the "boom boxes" Building 907 and 922.

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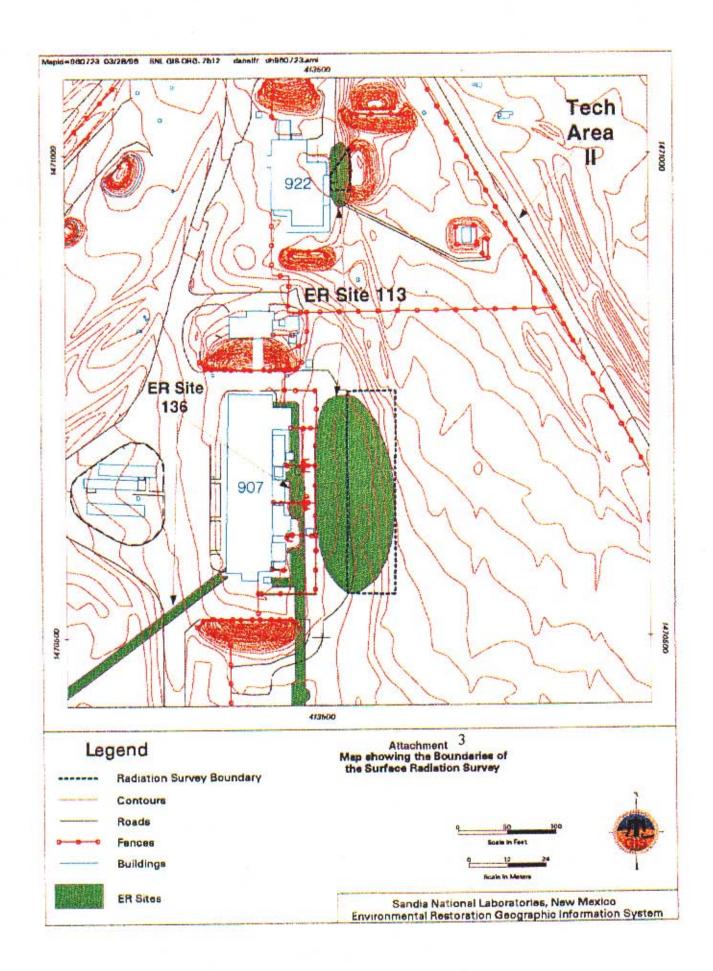
Building 907



Building 922

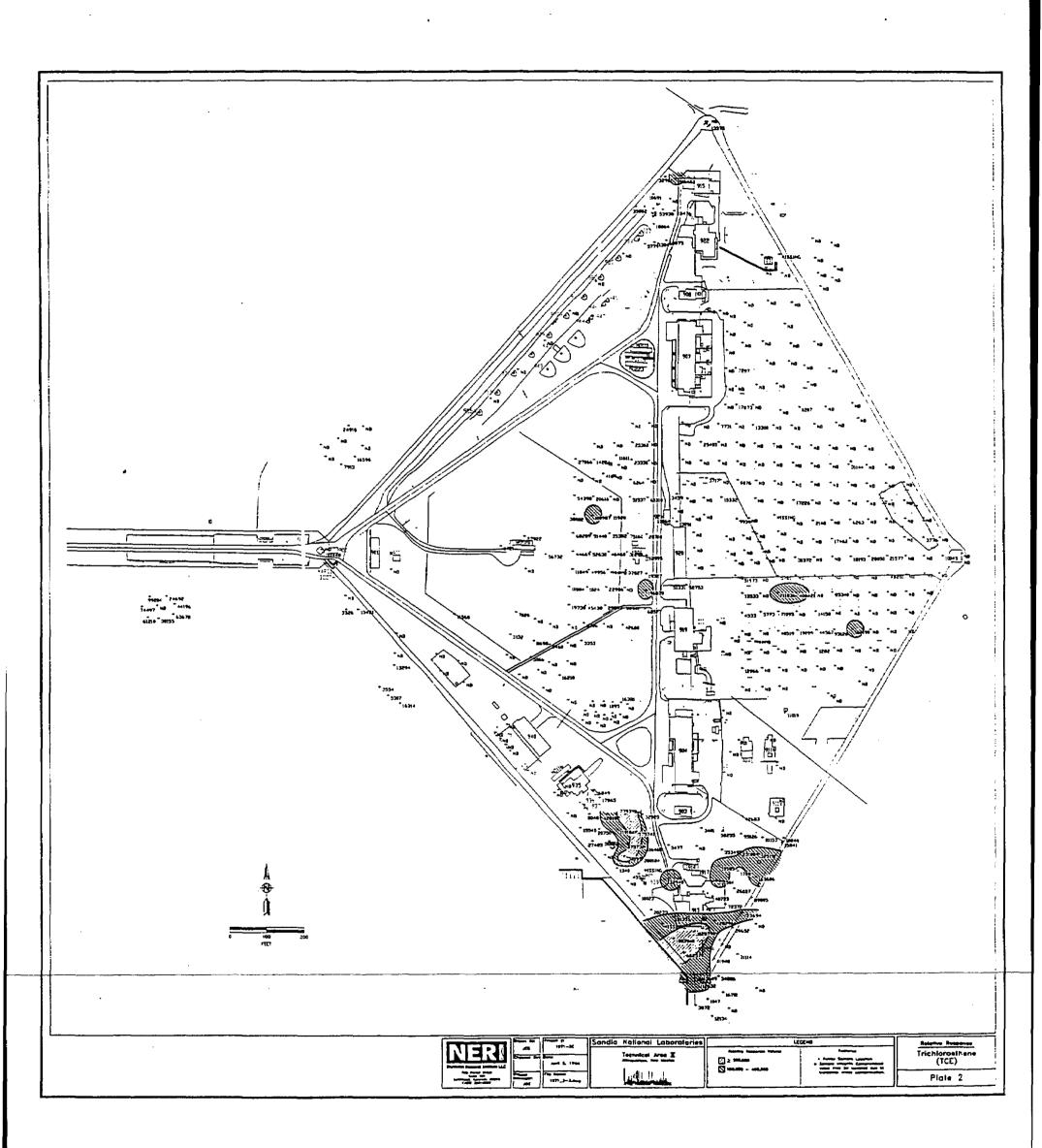
APPENDIX C

Map showing the boundaries of the surface radiation survey



APPENDIX D

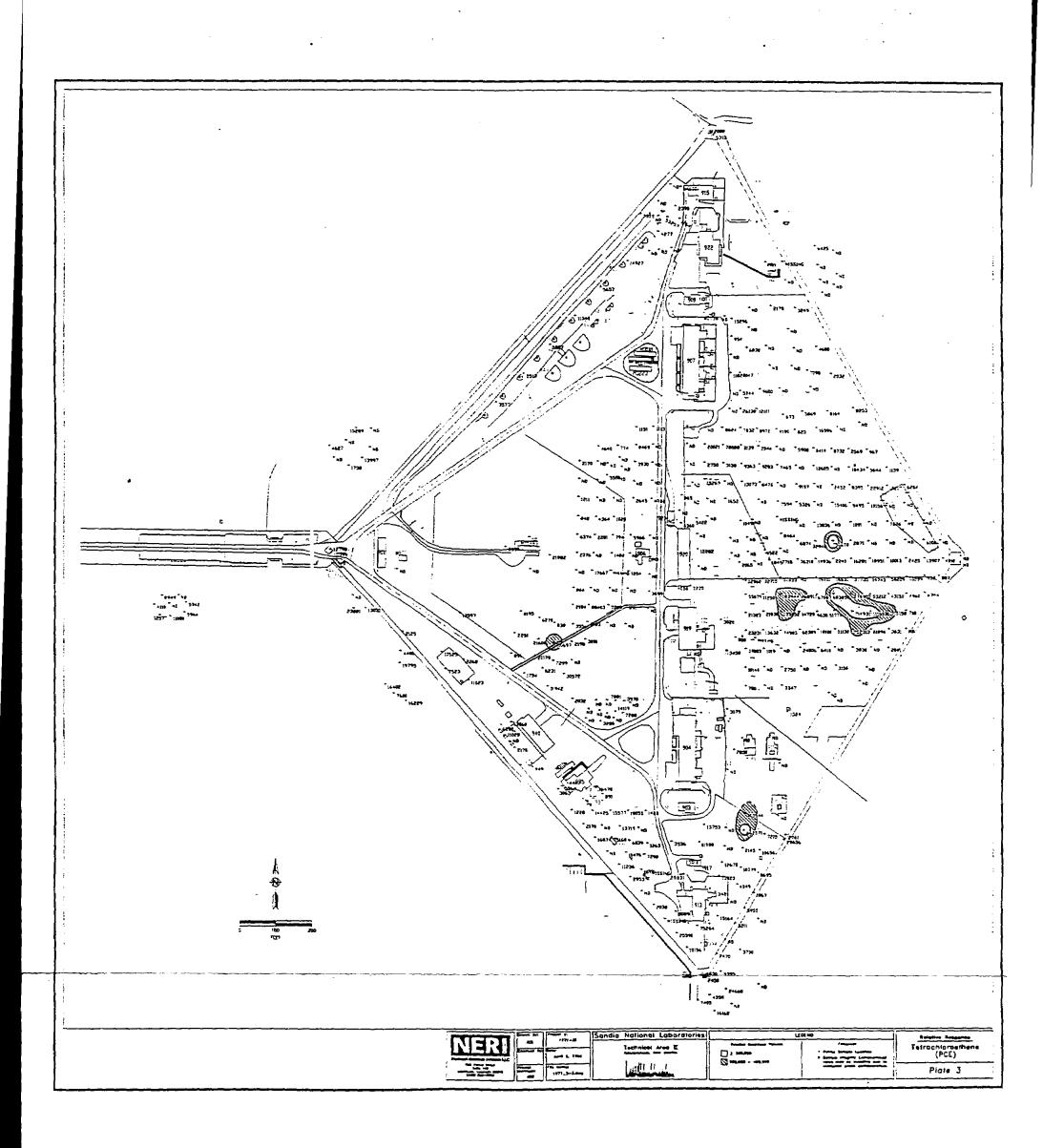
Map showing TCE results of the passive soil vapor survey



APPENDIX D

APPENDIX E

Map showing PCE results of the passive soil vapor survey

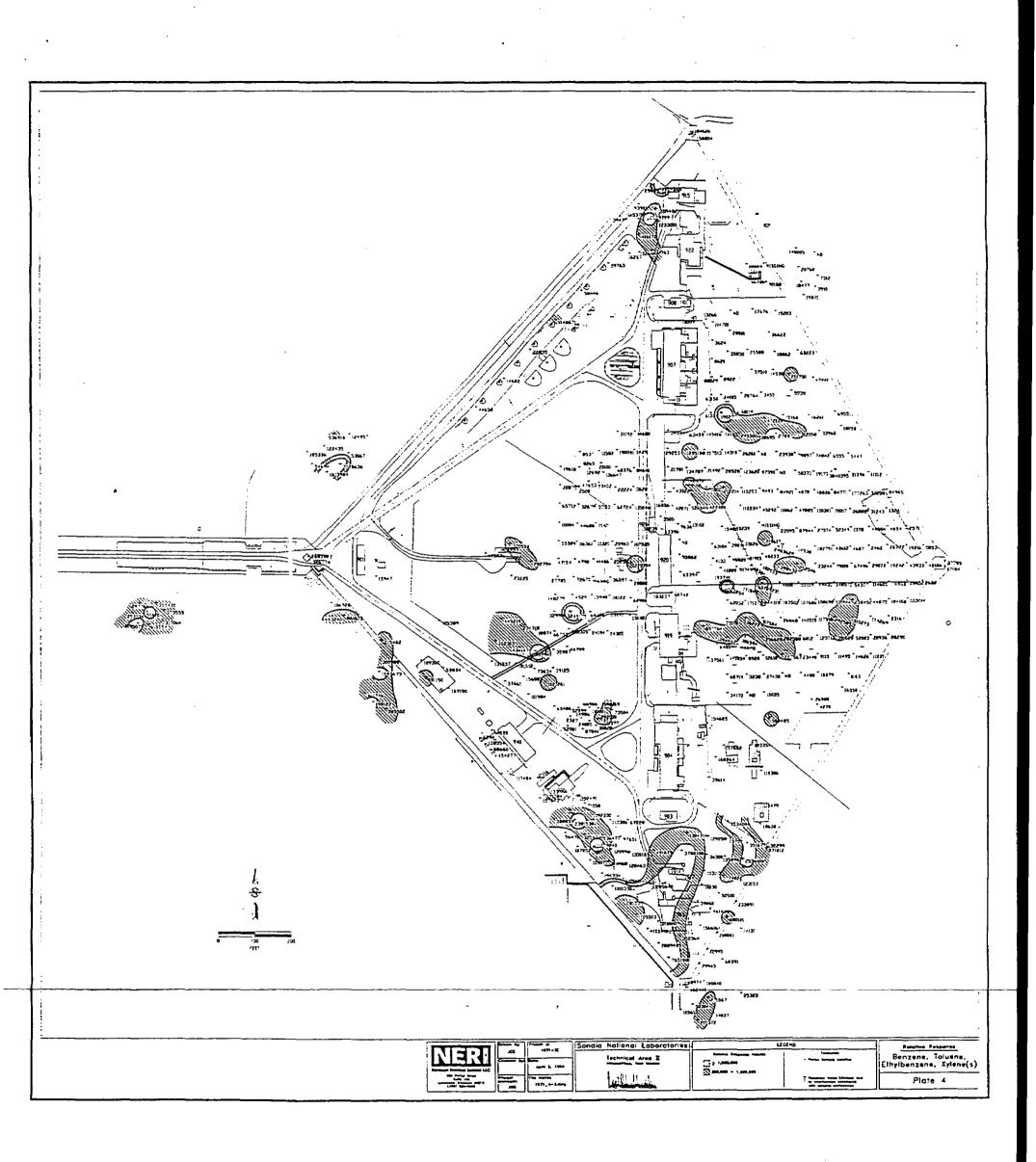


APPENDIX E

Map Showing PCE Results of the Passive Soil Vapor Survey.

APPENDIX F

Map showing BTEX results of the passive soil vapor survey

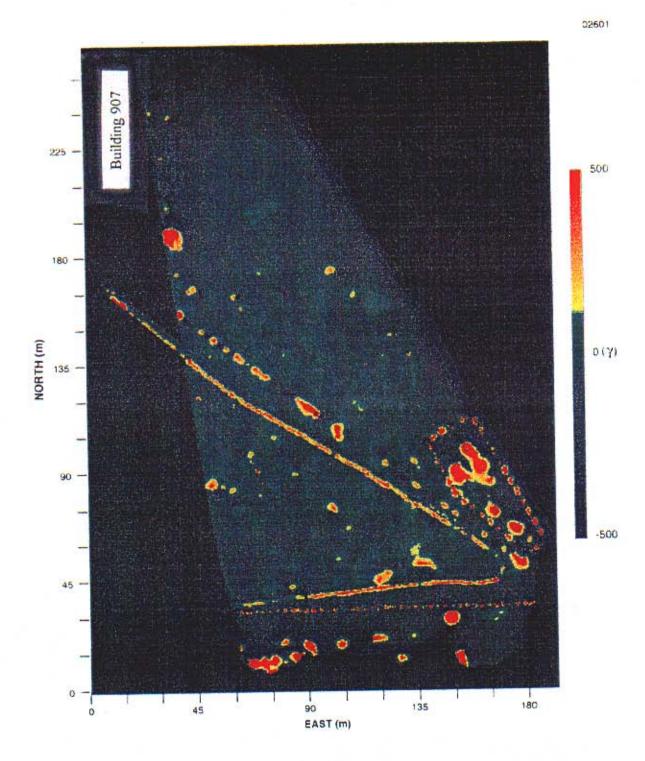


APPENDIX F

Map Showing BTEX Results of the Passive Soil Vapor Survey.

APPENDIX G

Figure showing results of the magnetometer survey of the eastern portion of TA-II

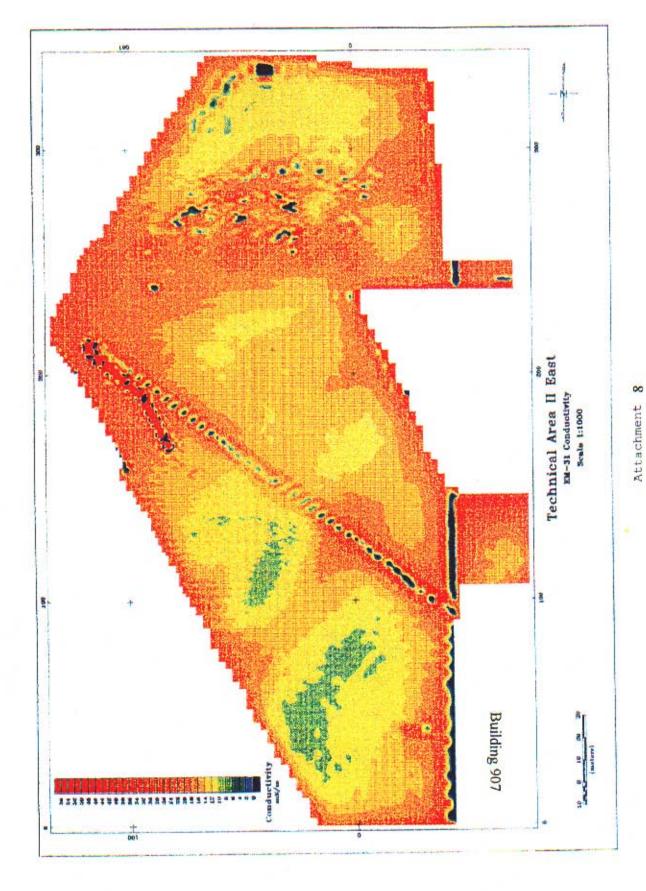


Attachment 7

Magnetometer Survey of the Eastern Portion of Technical Area II

APPENDIX H

Figure showing results of the electromagnetic survey of the eastern portion of TA-II



Electromagnetic Survey of Eastern Portion of Technical Area II

APPENDIX I

Table showing results of metals analyses for soil samples collected at ER Site 113

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Results of Metals Analysis for Soil Samples Collected at ER Site 113

Soil Sample Location	Depth	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)
907-1	0 - 6"	8.8	23.7	48.3	233
907-1	2'	7.6	21.1	20.7	229
907-2	0 - 6"	5.9	25.2	48.3	209
907-3	0 - 6"	6.3	51.6	23.2	174
907-3	2'	5.2	26	37.1	155
907-4	0 - 6"	7.6	15.6	16.7	213
907-5	0 - 6"	6.7	11.4	14	244
907-5	2'	7.8	12	14.1	235
907-6	0 - 6"	8.2	9.4	9.4	311
907-7	0 - 6"	6.5	8.1	10.8	232
907-8	0 - 6"	9.2	10.9	11.7	321
907-9	0 - 6"	7.3	10.3	10.2	239
907-10	0 - 6"	6.6	11.6	9.3	264
907-10	0 - 6 ⁿ	7.6	10.5	10.6	262
922-1	0 - 6"	5.6	110	71.4	204
922-2	0 - 6"	12.5	74.1	67.3	208
Reporting Limit		1.0	2.0	0.3	1.0
Background	0 - 6"	17.3	25.5	68	
UTL	> 0.5	12.8	88.2	11.2	
Subpart S					Food - 10,000
Action Level					Water - 400
EPA Guidance				400	